

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: ZHANG, et al.
SERIAL NO.: 09/204,639
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TITLE: PER USER AND NETWORK ROUTING TABLES
EXAMINER: Tran, P.
ART UNIT: 2664

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PRELIMINARY AMENDMENT

Please amend the above-identified application as follows.

In the Specification

Please replace the paragraph beginning at page 7, line 14, with the following rewritten paragraph:

At 152, the source address is used to find a per-user routing table corresponding to the user who sent the packet. FIG. 6 is a diagram illustrating a per-user routing table in accordance with a presently preferred embodiment of the present invention. Each per user routing table 250 contains a user address 252, indicating the host address of the user to which the routing table corresponds. Then the per-user routing table contains one or more entries 254, each entry corresponding to a currently accessible network for the corresponding user. Each entry 254 may

contain a range of addresses 256, indicating the network addresses which correspond to the corresponding accessible network, and a network identification 258, which identifies the corresponding accessible network. The range of addresses 256 will likely be the network addresses for all possible users in each network. Generally, when a network is first configured, it is assigned a range of addresses for all of its users. Not all the users may be logged on at any one moment, and some of the network addresses in the range may never be used, but this range still provides a way to determine if a packet should be routed to the network. Entries 254 are continuously updated by the gateway to reflect the currently accessible networks for each user connected to the gateway. Thus entries may be added, modified, or deleted as necessary.

In the Claims:

Please cancel claims 1-19, 22-33, and 35-42.

Please amend claims 20 and 34 as follows.

20. (Once Amended) A gateway for routing a packet sent from a user in a system in which the user may be connected to multiple networks simultaneously, said packet having a destination network, the gateway including:

a table unique to the user, each entry in said table having a router network address corresponding to each network currently accessible;

a destination network table entry searcher coupled to said table;

a tunneling session initiator coupled to said matching network router; and

a packet forwarder coupled to said tunneling session initiator.

34. (Once Amended) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for routing a packet sent from a user in a system in which the user may be connected to multiple

looking up said destination network in a table, each entry in said table having a router network address corresponding to each network currently accessible, wherein said table corresponds only to the user;

Please add new claims 43- 62 as follows.

44. (New) The gateway of claim 20, wherein said tunneling session initiator is coupled to a matching network router if said destination address of the packet is contained within one of said entries.

46. (New) The gateway of claim 45, wherein said default network router is coupled to the largest accessible network.

47. (New) A gateway for routing a packet sent from a user in a system in which the user may be connected to multiple networks simultaneously, said packet having a destination network, the gateway including:

a table unique to the user, each entry in said table having a router network address corresponding to each network currently accessible;

a destination network table entry searcher coupled to said table;

a matching network router coupled to said destination network table entry searcher if the destination network is listed in said table;

a tunneling session initiator coupled to said matching network router; and

a packet forwarder coupled to said tunneling session initiator.

48. (New) The gateway of claim 47, wherein said table is contained in a service profile.

49. (New) An apparatus for routing a packet sent from a user in a system in which the user may be connected to multiple networks simultaneously, including:

means for extracting a source address from the packet;

means for finding a per-user routing table corresponding to said source address, said per-user routing table corresponding only to the user and containing entries corresponding to one or more currently accessible networks for the user and the range of network addresses corresponding to said currently accessible networks;

means for extracting a destination address from the packet;

means for seeking an entry in said matching per-user routing table with a range of network addresses containing said destination address;

means for routing the packet to a matching network if said destination address is contained within one of said ranges of network addresses for said currently accessible networks; and

means for routing the packet to a default network if said destination address is not contained within one of said ranges of network addresses for said currently accessible networks.

50. (New) The apparatus of claim 49, wherein said matching network is said accessible network corresponding to said range of addresses in which said destination address is found.

51. (New) The apparatus of claim 49, wherein said default network is the largest accessible network.

52. (New) An apparatus for routing a packet sent from a user in a system in which the user may be connected to multiple networks simultaneously, including:

means for extracting a source address from the packet;

means for finding a per-user routing table corresponding to said source address, said per-user routing table corresponding only to the user and containing entries corresponding to one or more currently accessible networks for the user and the range of network addresses corresponding to said currently accessible networks;

means for extracting a destination address from the packet;

means for seeking an entry in said matching per-user routing table with a range of network addresses containing said destination address;

means for routing the packet to a matching network if said destination address is contained within one of said ranges of network addresses for said currently accessible networks; and

means for ignoring said packet and alerting the user to that effect if said destination address is not contained within one of said ranges of network addresses for said currently accessible networks.

53. (New) The apparatus of claim 52, wherein said matching network is said accessible network corresponding to said range of addresses in which said destination address is found.

54. (New) An apparatus for routing a packet sent from a user in a system in which the user may be connected to multiple networks simultaneously, said packet having a destination network, the apparatus including:

means for looking up said destination network in a table, each entry in said table having a router network address corresponding to each network currently accessible;

means for establishing a tunneling session to said matching router network address; and

means for forwarding the packet to said router network address through said tunneling session.

55. (New) The apparatus of claim 54, wherein said table is contained in a service profile.

56. (New) An apparatus for routing a packet sent from a user in a system in which the user may be connected to multiple networks simultaneously, including:

means for extracting a source address from the packet;

means for finding a per-user routing table corresponding to said source address, said per-user routing table corresponding only to the user and containing entries corresponding to one or more accessible networks for the user and the range of network addresses corresponding to said currently accessible networks;

means for extracting a destination address from the packet;

means for reading the entries of said matching per-user routing table, looking for a range of network addresses containing said destination address;

means for determining a destination network based upon a matching entry in said per-user routing table if said destination address is contained within one of said ranges of network addresses for said currently accessible networks;

means for routing the packet to a default network if said destination address is not contained within one of said ranges of network addresses for said currently accessible networks.

means for looking up said destination network in a table, each entry in said table having a router network address corresponding to each network currently accessible;

means for establishing a tunneling session to said corresponding router network address;
and

means for forwarding the packet to said router network address through said tunneling session.

57. (New) The apparatus of claim 56, wherein said destination network is one of said accessible networks corresponding to said range of addresses in which said destination address is found.

58. (New) The apparatus of claim 56, wherein said default network is the largest accessible network.

59. (New) The apparatus of claim 56, wherein said table is contained in a service profile.

60. (New) An apparatus for routing a packet sent from a user in a system in a system in which the user may be connected to multiple networks simultaneously, including:

means for extracting a source address from the packet;

means for finding a per-user routing table corresponding to said source address, said per-user routing table corresponding only to the user and containing entries corresponding to one or more accessible networks for the user and the range of network addresses corresponding to said currently accessible networks;

means for extracting a destination address from the packet;

means for reading the entries of said matching per-user routing table, looking for a range of network addresses containing said destination address;

means for determining a destination network based upon a matching entry in said per-user routing table if said destination address is contained within one of said ranges of network addresses for said currently accessible networks;

means for ignoring said packet and alerting the user to that effect if said destination address is not contained within one of said ranges of network addresses for said currently accessible networks;

means for looking up said destination network in a table, each entry in said table having a router network address corresponding to each network currently accessible;

means for establishing a tunneling session to said corresponding router network address;
and

means for forwarding the packet to said corresponding router network address through
said tunneling session.

61. (New) The apparatus of claim 60, wherein said matching network is one of said
accessible network corresponding to said range of addresses in which said destination address is
found.

62. (New) The apparatus of claim 60, wherein said table is contained in a service profile.

Abstract of the Disclosure

A revised abstract is appended to this Amendment.

REMARKS

The specification has been amended to correct minor errors noted in the last Office Action and otherwise. These corrections are of a clerical nature and do not add "new matter".

Claims 20 and 34 have been amended to further particularly point out and distinctly claim subject matter regarded as the invention. Support for these changes may be found in the specification, page 7, lines 16-18. The text of claim 21 is unchanged, but its meaning is changed because they depend from amended claims.

New claims 43-58 have been added. Claims 43-44 are identical to claims 20-21 except the additional limitation "a matching network router..." has been added. Support for this limitation may be found in the specification, on page 9, lines 20-25. Claims 45-58 are "means for" versions of method claims 1-14, which were allowed in the parent case.

Specification

The Office Action reminded Applicant of the proper language and format for an abstract of the disclosure. A modified abstract accompanies this amendment.

Additionally, a minor grammatical error has been corrected.

The 35 U.S.C. § 102 Rejection

Claims 20-21, and 34 stand rejected under 35 U.S.C. § 102(e) as being allegedly anticipated by Kinoshita¹. These claims were deleted from the parent case upon the request of the examiner, however no formal rejection has been made in light of the arguments outlined in

¹ U.S. Patent No. 5,802,047

the amendment filed August 31, 2001. Therefore, these arguments are substantially repeated here in regard to claims 20-21 and 34 and the rejection is respectfully traversed.

According to the M.P.E.P., a claim is anticipated under 35 U.S.C. § 102(a), (b) and (e) only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference².

The Office Action states:

With respect to claims 1, 8 and 15, & 19, 22, 36, Kinoshita teaches a connecting device between local area networks which interprets as a method for routing a packet sent from a user in a system in which the user may be connected to multiple networks simultaneously, which includes: extracting a source address from the packet (e.g. block S4 in Fig. 7); finding a per-user routing table corresponding to one or more currently accessible networks for the user and the range of network addresses corresponding to the currently accessible networks (col. 5, lines 44-48); extracting a destination address from the packet; seeking an entry in the matching per-user routing table with a range of network addresses containing the destination address (e.g. block S8 in Fig. 7); routing the packet to a matching network if the destination address is contained within one of the ranges of network addresses for the currently accessible networks (e.g. col. 6, lines 11-19); and routing the packet to a default network if the destination address is not contained within one of the ranges of network addresses for the currently accessible networks (see bridge paragraph between col. 5-6).

Kinoshita, however, does not disclose per-user routing tables. The table in Kinoshita is a learning table storing port addresses. The table contains "combinations between the MAC addresses and the physical ports 33 to 40 coupled with the hosts A to N". Col. 5, lines 17-19. As per its name, the learning table learns new combinations as it routes packets. For example, when a packet is received from a connected host A from a source MAC address "MAC", the table is referenced under the key "MAC-A". If no entry exists under this key, the information regarding the port in which the packet arrived is written to the learning table. If that information was already "known" to the table, there is no reason to enter it again. The incoming port information

² Manual of Patent Examining Procedure (MPEP) § 2131. See also *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

or incoming MAC address are not used in any way in the routing of the incoming packet.

Instead, this information may be used by future packets sent by others. For example, later, a user at a different MAC address or host might attempt to send a packet to the MAC dress "MAC" at host "A". Thus, at that point, the router could look up the key "MAC-A" in the learning table to determine the correct port. Therefore, this table is only designed for, and only useful for, determining ports. This is further buoyed by the fact that when the entry in the learning table has been there a predetermined period of time, it is deleted, because the information regarding the port is probably "stale".

In Kinoshita, there is only one table, and all port addresses for all users (and all destinations) are stored in that table. The invention in Kinoshita would be inoperable any other way, as the learning table often depends on information gathered about a user's port location when he is sending a packet when the same user is on the receiving end of a packet.

The present invention, however, uses a "table unique to the user, each entry in said table having a router network address corresponding to each network currently accessible". Each user within the system has a unique table. Thus, if there are multiple users within the network, there will be multiple tables. The claims have been amended to make this limitation more clear. The use of multiple tables allows the system to be designed to provide the most efficient serving of packets as possible. An ISP may modify the routing tables based on the user's profile, or the user's location, or any other factor it is felt is important. In a common example, a a user's table may have a number of different entries, thus providing for a number of different possible routes. Thus, the present invention allows "different users to have access to different sets of networks, and also allow the user some flexibility in choosing which network to access". Specification, page 9, lines 3-4.

In view of the foregoing, it is respectfully asserted that the claims are now in condition for allowance.

Dependent Claims

The argument set forth above is equally applicable here. The base claims being allowable, the dependent claims must also be allowable.

In view of the foregoing, it is respectfully asserted that the claims are now in condition for allowance.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version With Markings to Show Changes Made".

Request for Allowance

It is believed that this Amendment places the above-identified patent application into condition for allowance. Early favorable consideration of this Amendment is earnestly solicited.

If, in the opinion of the Examiner, an interview would expedite the prosecution of this application, the Examiner is invited to call the undersigned attorney at the number indicated below.

Respectfully submitted,

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ABSTRACT OF THE DISCLOSURE

A gateway is provided which routes a packet sent from a user to the connected network which would maximize the chances that the packet arrives at its destination in the quickest way possible. This is accomplished by extracting a source address from the packet; searching through one or more per-user routing tables to find a per-user routing table corresponding to the source address, the per-user routing table containing a list of currently accessible networks for the user and the range of network addresses corresponding to the currently accessible networks; extracting a destination address from the packet; traversing the entries of the matching per-user routing table, looking for a range of network addresses containing the destination address; routing the packet to a matching network if the destination address is contained within one of the ranges of network addresses for the currently accessible networks; and routing the packet to a default network if the destination address is not contained within one of the ranges of network addresses for the currently accessible networks. The gateway may also avoid the drawbacks of using hops in transporting packets to a destination by looking up the destination network in a table, each entry in the table having a router network address corresponding to each network currently accessible; establishing a tunneling session to the matching router network address; and forwarding the packet to the router network address through the tunneling session.

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification

Paragraph beginning at line 14 of page 7 has been amended as follows:

At 152, the source address is used to find a per-user routing table corresponding to the user who sent the packet. FIG. 6 is a diagram illustrating a per-user routing table in accordance with a presently preferred embodiment of the present invention. Each per user routing table 250 contains a user address 252, indicating the host address of the user to which the routing table corresponds. Then the per-user routing table contains one or more entries 254, each entry corresponding to a currently accessible network for the corresponding user. Each entry 254 may contain a range of addresses 256, indicating the network addresses which correspond to the corresponding accessible network, and a network identification 258, which identifies the corresponding accessible network. [the] The range of addresses 256 will likely be the network addresses for all possible users in each network. Generally, when a network is first configured, it is assigned a range of addresses for all of its users. Not all the users may be logged on at any one moment, and some of the network addresses in the range may never be used, but this range still provides a way to determine if a packet should be routed to the network. Entries 254 are continuously updated by the gateway to reflect the currently accessible networks for each user connected to the gateway. Thus entries may be added, modified, or deleted as necessary.

In the Claims:

Please cancel claims 1-19, 22-33, and 35-42.

Please amend claims 20 and 34 as follows.

20. (Once Amended) A gateway for routing a packet sent from a user in a system in which the user may be connected to multiple networks simultaneously, said packet having a destination network, the gateway including:

a table unique to the user, each entry in said table having a router network address corresponding to each network currently accessible;

a destination network table entry searcher coupled to said table;

a tunneling session initiator coupled to said matching network router; and

a packet forwarder coupled to said tunneling session initiator.

34. (Once Amended) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform method steps for routing a packet sent from a user in a system in which the user may be connected to multiple networks simultaneously, said packet having a destination network, said method steps comprising:

looking up said destination network in a table, each entry in said table having a router network address corresponding to each network currently accessible, wherein said table corresponds only to the user;

establishing a tunneling session to said corresponding router network address; and

forwarding the packet to said corresponding router network address through said tunneling session.